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Title

Room Temperature Curing Epoxy-based Coating having Anti-Sticking and Wear-Resistant Properties

Abstract

The present invention relates to a room temperature curing epoxy-based anti-sticking coating, which may be used for anti-sticking, wear-resisting and lubricating under conditions of -18 ℃ -150 ℃ . Said coating comprising as solid fillers polytetrafluoroethylene, metal oxide, *etc.* is cured into a film at room temperature to 120℃, which is measured on an MHK 500 ring-on-block testing machine to have an abrasion travel of 2.2 m/μm, a friction coefficient of 0.13-0.16, an impact strength of 50 kg·cm, an adhesion of the first grade, and a flexibility of 1mm.

Description

The present invention concerns a room temperature curing epoxy-based coating having anti-sticking and wear-resistant properties, which may be used under conditions of -18 ℃-150℃.

The coatings for curing at normal temperatures are generally used for paint-coating storage tanks, pipes, drilling towers, petrochemical devices and the like, and there are few applications in the anti-sticking at low temperatures.

The object of the present invention is to prepare an anti-sticking and wear-resistant coating, which is cheap and convenient to be applied, has the anti-sticking effect at low temperatures and may be applied under conditions of -18℃-150℃.

The present invention uses epoxy resins as a binder, polyamides as a curing agent, and polytetrafluoroethylene resins as a lubricant, and fills titanium dioxide as a wear-resistance enhancer, to prepare a coating having anti-sticking and wear-resistant properties at low temperatures.

Said materials are used in the present invention for the following properties. Epoxy resins have high adhesive strength to the surface of metallic and non-metallic materials, good weatherability and chemical resistance, and long serviceable life, and may be applied on the steel surfaces which are wet or are not completely derusted. Polyamides

having a low molecular weight may be used as a curing agent for epoxy resins. Moreover, polyamides which are in a state of thick liquid at normal temperatures have good resilience, strong adhesion and better effects of activity flexibilizer. Polytetrafluoroethylene resins have excellent lubricating properties, low friction coefficient and extremely low surface free energy. In addition, titanium dioxide may be used as the reinforcing and abrasive resistant materials of the coating.

The coating of the present invention comprises,

component A: 20-33% by weight of epoxy, 20-30% by weight of polytetrafluoroethylene, 2-10% by weight of titanium dioxide, and 35-45% by weight of a mixed solvent; and

component B: 5-15% by weight of polyamide resin, 0.1-1.0% by weight of a curing accelerator, and the remaining of a mixed solvent,

wherein the mixed solvent consists of methyl isobutyl ketone, cellosolve, xylene, dioxane, ethanol and acetone, and there are no definite requirements on the ratio thereof.

Polytetrafluoroethylene used in the present invention has a particle size of less than 3 μm, and titanium dioxide has a particle size of less than 35 μm. Epoxy resin is 6101. Polyamide used therein has an amine value of 200 ± 30, and a molecular weight of 1,200-1,500. In addition, DMP-30 is used as a curing agent.

The coating of the present invention is prepared by homogeneously mixing components A and B in a ratio as required, diluting the mixture, and then spraying the resulting coating.

The spraying method comprises the steps of selecting a spray gun, preparing a testing block of A3 steel plate (60 mm x 120 mm), and spraying by using an air compressor or nitrogen gas as the air source with a spray pressure of 102 Pa. Generally, the thickness of the film sprayed is controlled within the range of 30-50 μm. After spraying, the sprayed coating is top-dried at room temperature for 5 hours, totally-dried for 24 hours (or oven-dried at 95℃ for 40 min, or at 120 for 30 min), to obtain a grayish-dark grey coating.

Examples of the present invention are shown in Table 1.

Table 1

Group	Ingredient	Example 1	Example 2	Example 3
Component A	Epoxy resin	28.8	22.0	25.0

	Polytetrafluoroethylene	21.0	24.0	22.0
	Metallic oxide	8.0	6.0	4.0
	Mixed solvent	32.0	34.0	36.0
Component B	Polyamide resin	6.6	8.0	8.8
	DMP-30	0.4	0.6	0.5

The assay results are shown in Table 2.

Table 2

Items	Assay conditions	Assay results
Color of coating	Eye measurement	Grey
Wear resistance	Load: 320 N; speed: 154 m/min	3.4
Friction coefficient	-	0.13-0.16
Adhesion (grade)	GB1720-79	2
Resistance to impact	GB1732-79	45
Flexibility	GB1731-79	2
Contact angle	Contact angle meter	103°

Claims

1. A room temperature curing epoxy-based coating having anti-sticking and wear-resistant properties at low temperatures, comprising

component A: 20-33% by weight of epoxy, 20-30% by weight of polytetrafluoroethylene, 2-10% by weight of titanium dioxide, and 35-45% by weight of a mixed solvent; and

component B: 5-15% by weight of polyamide resin, 0.1-1.0% by weight of a curing accelerator, and the remaining of a mixed solvent.

2. The coating according to claim 1, characterized in that the mixed solvent consists of methyl isobutyl ketone, cellosolve, xylene, dioxane, ethanol and acetone.
3. The coating according to claim 1, characterized in that the polyamide used therein has an amine value of 200 ± 30 and a molecular weight of 1,200-1,500.

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权利要求书1页 说明书2页 附图页数0页

[54]发明名称 一种环氧基室温固化防粘耐磨涂料

[57]摘要

本发明涉及一种环氧基室温固化防粘涂料，可用于-18℃—150℃条件下的防粘耐磨和润滑问题。此涂料以聚四氟乙烯、金属氧化物等为固体填料，在室温-120℃条件下固化成膜，在MHK-500型环块试验机上测得耐磨行程2.2m/μm，摩擦系数为0.13—0.16、冲击强度为50kg·cm，附着力为1级，柔韧性为1mm。

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权 利 要 求 书

1、 一种室温固化环氧基低温防粘耐磨涂料，组成为（重量百分含量）：

组分 A	环氧树脂	20-33 %
	聚四氟乙烯	20-30 %
	二氧化钛	2-10 %
	混合溶剂	35-45 %
组分 B	聚酰胺树脂	5-15 %
	固化促进剂 DMP-30	0.1-1.0 %
	混合溶剂	余量

2、 如权利要求 1 所说的涂料，其特征在于混合溶剂由甲基异丁酮、溶纤剂、二甲苯、二氧六环、乙醇、丙酮组成。

3、 如权利要求 1 所说的涂料，其特征在于所选用的聚酰胺的胺值为 200±30，分子量为 1200-1500。

说　明　书

一种环氧基室温固化防粘耐磨涂料

本发明涉及一种环氧基室温固化，可在-18℃-150℃条件下使用的防粘耐磨涂料。

常温固化的涂料，多用于涂装储罐、管道、钻塔、石油化工等设备涂装。但在低温防粘方面的应用却很少。

本发明的目的是制成一种可在低温条件下起到防粘效果的耐磨、廉价，易于施工的常温固化，可在-18℃-150℃条件下使用的防粘耐磨涂层。

本发明选用环氧树脂为粘结剂，聚酰胺为固化剂，聚四氟乙烯树脂为润滑剂，填充二氧化钛作耐磨增强剂，制成一种低温防粘耐磨涂料。

本发明选用上述材料的理由是：环氧树脂对金属和非金属材料表面的附着强度高、耐侯性好、使用期长、可在不完全除锈或潮湿钢铁表面施工，耐化学品性好等优点。低分子量聚酰胺可作为环氧树脂的固化剂，其在常温下是粘稠液体，具有弹性好、附着力强和良好的活性增韧剂效果。聚四氟乙烯树脂具有优良的润滑性能，低的摩擦系数和极低的表面自由能。二氧化钛可用来做涂料的增强和耐磨材料。

本发明由组分 A 和组分 B 组成(重量百分含量)：

组分 A	环氧树脂	20-33 %
	聚四氟乙烯	20-30 %
	二氧化钛	2-10%
	混合溶剂	35-45 %
组分 B	聚酰胺树脂	5-15 %
	固化促进剂 DMP-30	0.1-1.0%
	混合溶剂	余量

混合溶剂由甲基异丁酮、溶纤剂、二甲苯、二氧六环、乙醇、丙酮组成，它们之间的比例无一定的要求。

本发明选用的聚四氟乙烯粒度小于 3μm；二氧化钛的粒度小于 35μm；环氧树脂为 6101，聚酰胺的胺值 200±30，分子量为 1200-1500，DMP-30 为固化促进剂。

本发明制备方法为：

将组分 A 和组分 B 按所需比例混合均匀、稀释，再进行涂料喷涂。

喷涂的方法为：选用喷枪，准备试块，试块选用 A3 钢板（60mm×120mm），用空气压缩机或氮气为气源进行喷涂，喷涂压力为 102Pa。喷涂膜厚一般控制在 30-50μm。喷涂完成后，在室温条件下 5 小时表干，实干 24 小时（或烘干 95℃40 分钟、120℃30 分钟），得到浅灰-深灰色涂层。

本发明的实施例如表 1。

表 1

组别	成分	例 1	例 2	例 3
组分 A	环氧树脂	28.0	22.0	25.0
	聚四氟乙烯	21.0	24.0	22.0
	金属氧化物	8.0	6.0	4.0
	混合溶剂	32.0	34.0	36.0
组分 B	聚酰胺树脂	6.6	8.0	8.8
	DMP-30	0.4	0.6	0.5

所得测试结果见表 2：

测试项目	测试条件	测试结果
涂层颜色	目测	灰色
耐磨性（m/μm）	负荷：320N 速度：154m/min	3.4
摩擦系数	-	0.13-0.16
附着力（级）	GB1720-79	2
抗冲击强度（kg．cm）	GB1732-79	45
柔韧性(mm)	GB1731-79	2
接触角	接触角计	103°